

**This Page Is Inserted by IFW Operations  
and is not a part of the Official Record**

## **BEST AVAILABLE IMAGES**

**Defective images within this document are accurate representations of the original documents submitted by the applicant.**

**Defects in the images may include (but are not limited to):**

- **BLACK BORDERS**
- **TEXT CUT OFF AT TOP, BOTTOM OR SIDES**
- **FADED TEXT**
- **ILLEGIBLE TEXT**
- **SKEWED/SLANTED IMAGES**
- **COLORED PHOTOS**
- **BLACK OR VERY BLACK AND WHITE DARK PHOTOS**
- **GRAY SCALE DOCUMENTS**

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problem Mailbox.**



# (12) UK Patent Application (19) GB (11) 2 209 716 (13) A

(43) Date of A publication 24.05.1989

(21) Application No 8821317.8

(22) Date of filing 12.09.1988

(30) Priority data

(31) 428187

(32) 11.09.1987

(33) AU

(71) Applicant

Gordon Joseph Taylor

18 Seng Street, Graceville, QLD 4075, Australia

(72) Inventor

Gordon Joseph Taylor

(74) Agent and/or Address for Service

Hulse and Company

Cavendish Buildings, West Street, Sheffield, S1 1ZZ,  
United Kingdom

(51) INT CL<sup>4</sup>

B60G 3/00, F16F 1/38

(52) UK CL (Edition J)

B7D DSCX D114 D120

F2S SCF S708

U1S S1847

(56) Documents cited

GB 2174961 A

GB 1571945 A

GB 1514378 A

GB 1412014 A

GB 0827261 A

(58) Field of search

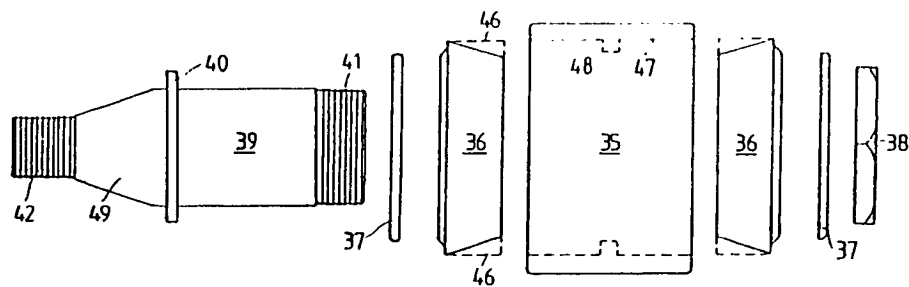
UK CL (Edition J) B7D DSCD DSCX, F2S SCF

INT CL<sup>4</sup> B60G 3/00, F16F 1/36 1/38

## (54) Bush assembly

(57) A bush assembly in combination with a torque rod or stabilizing bar 39, or part thereof having a rod or bar 39 mounted within a housing member 35. The housing member has a bore and flexible bushes 36 are mounted on the rod or bar within the bore and are retained on the rod or bar by a retainer 40 formed in part as part of the rod or bar. Further retention is effected by a nut and washer 38, 37 screwed onto a threaded section 41 of the rod or bar.

The bush is easily replaced, in comparison to the type comprising two cylindrical sleeves with a rubber body bonded between, and which is attached by interference fit on the rod or bar or in a housing on the vehicle.



GB 2 209 71

1/3

2209716

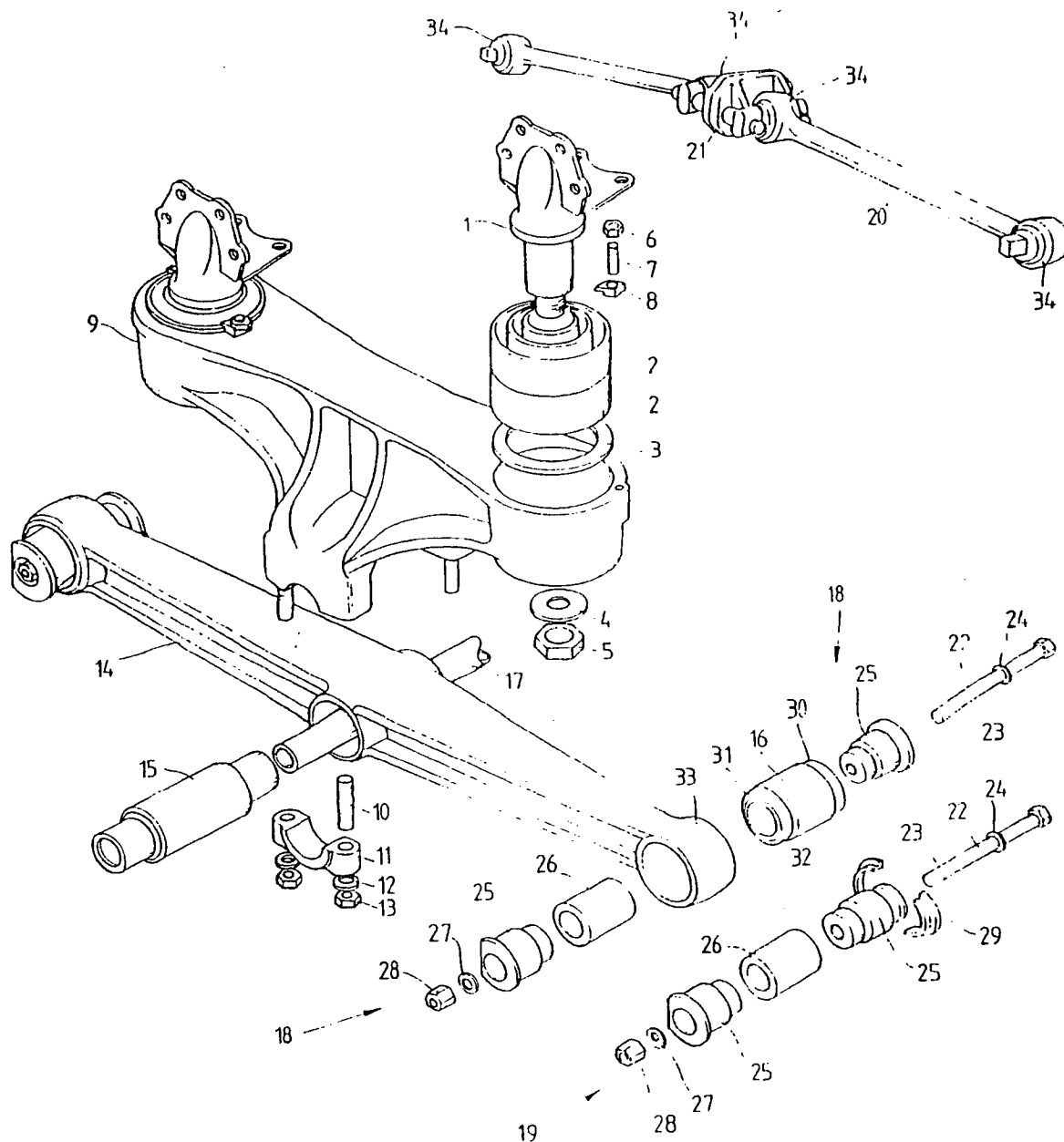


FIG 1

**POOR  
QUALITY**

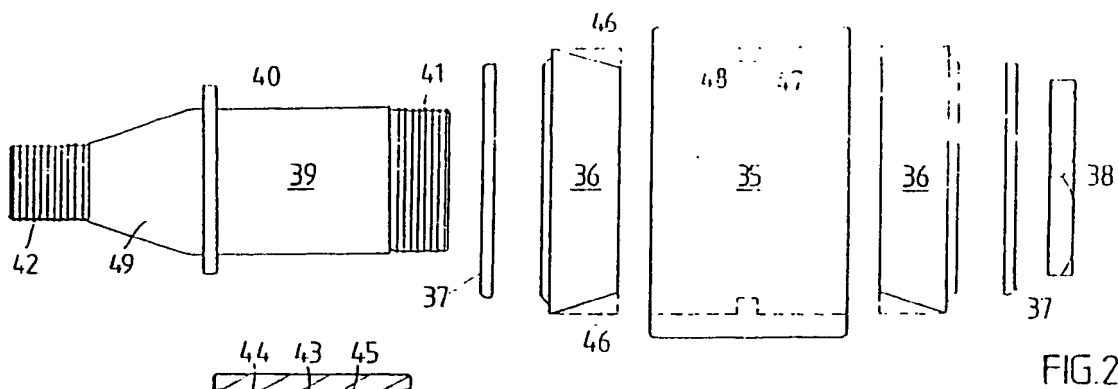


FIG. 2

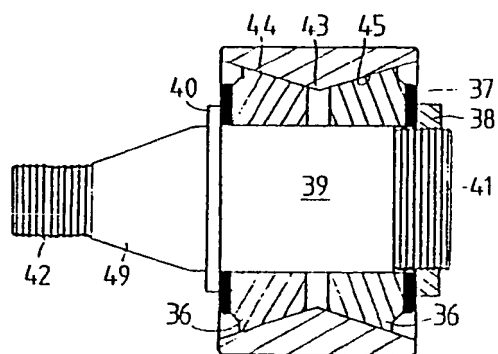


FIG. 3

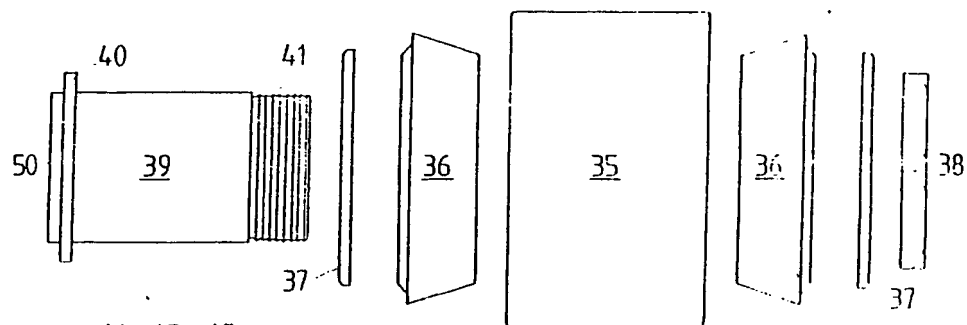


FIG. 4

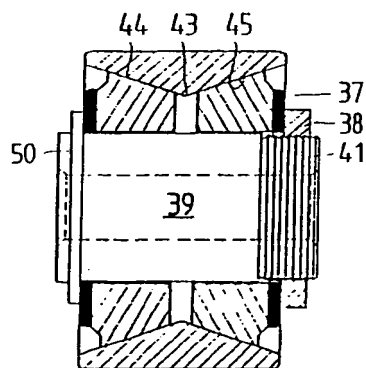
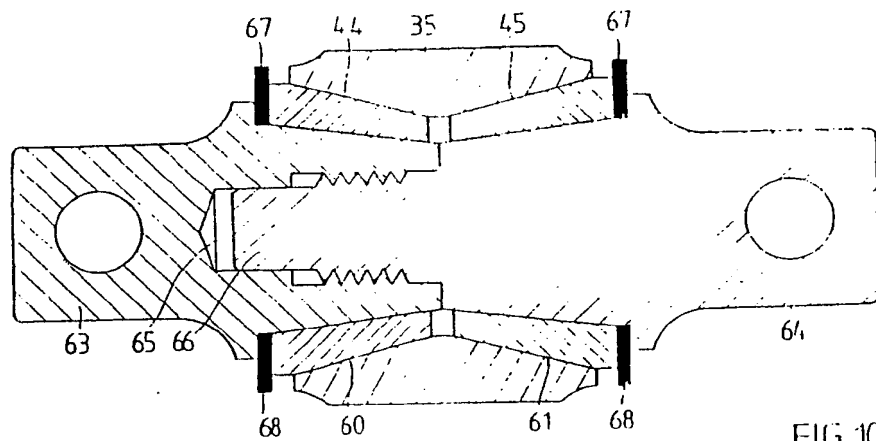
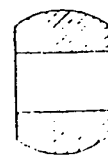
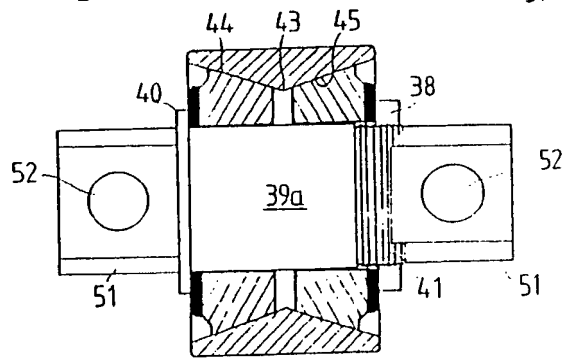
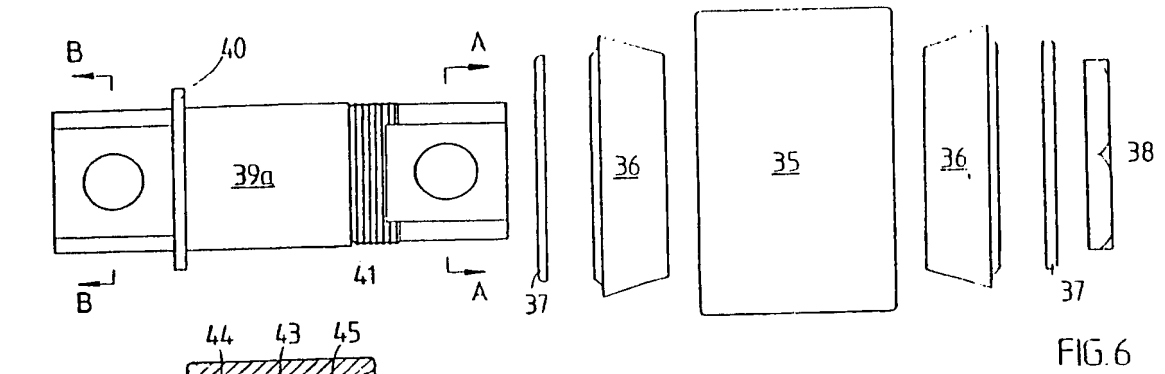


FIG. 5



2209716

BUSH ASSEMBLY

This invention relates to a new bush assembly in combination with a torque rod or stabilizing bar which may be used in vehicle chassis support members such as torque rods, equalising beams or other stabilising members.

Conventional bush assemblies for use with torque rods have included as one component a sleeve member normally formed from steel and an internal lining of rubber which was bonded to the interior surface of the sleeve member. There was also normally included an attachment rod or inner shaft usually formed from metal having a central enlarged portion formed as a ball or block which resiliently engaged with the rubber lining of the sleeve member. The sleeve member was normally located at each end of a torque rod by an interference fit wherein the sleeve member was pressed into an associated mating end ring of the torque rod by a large press.

A conventional bush assembly which was used for an equalizing beam was of similar construction including a bushing member having an outer metal sleeve which was press fitted into a mating ring located at each end of the equalizing beam. Again an internal lining of rubber was bonded to the interior surface of the outer metal sleeve.

Such conventional bush assemblies in the case of repair or maintenance were extremely costly to repair and the usual method which was adopted was to disconnect the torque

rod or equalizing beam from the chassis and transport the relatively heavy rod or beam to a specialised press millequipped with a large press to disconnect the metal sleeve bushing having the bonded rubber lining from an associated end of the beam or rod. Normally the original bushing was then discarded and replaced with a new bushing which again had to be press fitted into an associated end of the beam or rod by the large press at the press mill. The beam or rod subsequently was transported back to the garage for reattachment to the vehicle chassis. Also once it was borne in mind that bonded rubber did not have a long operational lifetime because of its tendency to crack or fracture under repeated flexing then the problems of replacement or maintenance of such conventional bushings became exacerbated.

It therefore is an object of the invention to provide a bush assembly in combination with a stabilizing rod or bar which may alleviate the aforementioned problems associated with the prior art.

Accordingly, the invention provides a stabilizing bar or torque rod in combination with a bush assembly for a vehicle having a housing member with a bore therethrough, one or more bushes of flexible material within the bore, the rod or bar passing through the bushes and retaining means formed as part of the rod or bar for holding the bushes relative thereto and in the bore.



The bush assembly of the invention includes one or more bushes formed from flexible material which are releasably attachable to a housing member which in one form may comprise a sleeve or tube suitably formed from rigid material such as metal (e.g. steel) or which in another form may form part of a chassis support member such as a torque rod, equalizing beam or other stabilising member. The bush assembly of the invention includes retaining means for retaining the bush(es) in the housing member.

The invention may include a plurality of bushes formed from flexible material and more suitably a pair of bushes which may be retained in the housing member. While the bushes may be in the form of a cylinder having open ends it is preferred that each bush is tapered (i.e. having a progressively decreasing lateral dimension from one end to another or from at least one end). The preferred shape is similar to a truncated cone. Each bush may be formed from natural or synthetic rubber or deformable plastics material or other suitable flexible material.

The housing member may have any suitable shape. However, preferably the housing member is a cylindrical or substantially cylindrical tubular member. When a pair of bushes are used which are each tapered it is desirable that the internal surface of the housing member have a corresponding or mating configuration.

The housing member may also have associated therewith retaining means for retaining the bushes in the housing member. In one form this may comprise an inner shaft which is inserted through the internal bore of the housing member having a screw threaded portion engageable by a locknut or other suitable locking member. In this arrangement the inner shaft may also be provided with an abutment flange for direct or indirect engagement with one of the tapered bushes. The other bush may be engaged directly or indirectly by the locknut.

However, any other suitable retaining means may be used such as locknuts engaging directly or indirectly with both bushes or alternatively clips or the like could be employed which are releasably attachable to the housing member.

Reference may now be made to a preferred embodiment of the invention as shown in the attached drawings wherein:-

FIG 1 is an exploded perspective view of a conventional vehicle suspension system including stabilizing members such as torque rods and equalizing beams to which the bush assembly of the invention is especially directed;

FIG 2 is an exploded view of a first bush assembly combination constructed in accordance with the invention;

FIG 3 is an assembled view of the combination shown in FIG 2;

FIG 4 is an exploded view of a second bush assembly combination constructed in accordance with the invention;

FIG 5 is an assembled view of the combination shown in FIG 4;

5 FIG 6 is an exploded view of a third type of bush assembly combination constructed in accordance with the invention;

FIG 7 is an assembled view of the combination shown in FIG 6;

10 FIGS 8-9 are sectional views taken along lines B-B and A-A respectively of FIG 6; and

FIG 10 is a sectional view of another bush assembly combination embodiment of the invention.

15 In FIG 1 the vehicle suspension system shown includes frame hanger 1, shear spring 2, spacer ring 3, washer 4, nuts 5 and 6, stud 7, clamp 8, saddle assembly 9, stud 10, cap 11, washer 12, nut 13, equalizing beam 14, centre bush 15, end bushes 16, cross tube 17, kit of parts 18 for use with end bush 16 and an alternative kit of parts 19  
20 for use with end bush 16. There is also shown torque rod 20 and frame bracket 21. Kit of parts 18 includes inner shaft 22 having screw threaded portion 23, abutment flange 24, bush support member 25, spacer sleeve 26, washer 27, and locknut 28. Similar reference numerals are used with kit of  
25 parts 19. However ring member 29 is also shown.

The conventional end bushing 16 has an outer metal sleeve 30, rubber 31 bonded thereto and inner sleeve 32. End bushing 16 has to be inserted in end ring 33 of equalizing beam 14 by an interference fit which has to be accomplished by a large press with the resultant problems as described above. Bushings 34 associated with torque rod 20 are of a similar construction.

In FIG 2 a bush assembly constructed in accordance with the invention includes housing member 35, tapered bushes 36, washers 37, locknut 38 and inner shaft 39. Inner shaft 39 has abutment flange 40 and screw threaded part 41 which engages with locknut 38 as shown in FIG 3/ Inner shaft 39 also has screw threaded part 42 for attachment to a locknut and washer (not shown).

FIG 3 shows housing member 35 with an internal surface 43 having tapered parts 44 which mate with tapered surfaces 45 of bushes 36. However, in a variation of the above bushes 36 may have straight or cylindrical outer surfaces 46 (see figure 2) which mate with mating surfaces 47. Abutment 48 may separate bushes 36 in this arrangement.

In the arrangement shown in FIG 3 it is of course possible for the housing member 35 to be omitted and end ring 33 of beam 14 to have an internal surface having a similar shape as the internal surface 43.

In the bush assembly shown in FIGS 4-5 a similar arrangement is shown as described in detail in FIGS 2-3.

This is an alternative equalizing beam end bush assembly and in the embodiment of FIGS 4-5 the only significant change is the omission of tapered part 49 and screw threaded part 42 of inner shaft 39. This is replaced by end portion 50.

5 In the bush assembly shown in FIGS 6-9 this is suitable for a torque rod as will be apparent from a review of FIG 1. The only significant change is the provision of inner shaft 39A having end portions 51 and attachment apertures 52 which attach to frame bracket 21 shown in FIG 1  
10 FIGS 8-9 show sectional views B-B and A-A respectively.

From a review of the foregoing it will be apparent that bush assemblies shown in FIGS 2-9 are easily disconnected by the unscrewing of locknut 38 to thereby release tapered bushes 36. Substitute bushes 36 may then be  
15 inserted in housing member 35 and the whole assembly secured together by tightening of locknut 38. This is in stark contrast from the prior art shown in FIG 1.

The bushes shown in figures 3, 5 and 7 may be tapered on both sides rather than just on one side as shown  
20 in these figures. If this is done the housing member as well as the support member should be correspondingly tapered.

In the figure 10 embodiment a housing 35 is shown having a bore with tapered surfaces 44, 45. Two bushes 60, 61 are shown located within the bore. The support members  
25 63, 64 are members for use in a torque rod. One member 63 is formed with a thread bore or socket 65 whilst the other

member 64 has a thread stud or spigot 66. Each member 63, 64 has a shoulder 67 such that when the parts are assembled with washers 68 the assembly has the configuration shown in figure 10.

5

It will also be appreciated that the invention includes within its scope an assembly of stabilizing member and associated bush assemblies as well as the bush assembly per se.

10

CLAIMS

1. A stabilizing bar or torque rod in combination with a bush assembly for a vehicle having a housing member with a bore therethrough, one or more bushes of flexible material within the bore, the rod or bar passing through the bushes and retaining means formed as part of the rod or bar for holding the bushes relative thereto and in the bore.
2. The combination of claim 1 including two said bushes.
3. The combination of claim 1 wherein said bore has an abutment intermediate its length against which the bushes locate.
4. The combination of claim 1 wherein the bore has a tapered profile and the bushes have correspondingly tapered outer peripheries.
5. The combination of claim 3 or 4 wherein the rod or bar member has an abutment flange.
6. The combination of claim 5 wherein said retaining means comprises a threaded fastener mountable relative to the support member to retain the bushes between the abutment flange and the threaded fastener.

7. The combination of claim 6 including a respective washer located between the abutment flange and one said bush and between the threaded fastener and the other said bush.

8. The combination of claim 6 or 7 wherein said member is screw threaded to receive the threaded fastener.

9. The combination of claim 4 wherein the tapered bore configuration is provided by a first internal taper providing an enlarged outer bore diameter at one end of the bore and terminating in a reduced inner bore diameter intermediate the bore and a second internal taper providing an enlarged outer bore at the other end of the bore and terminating in a reduced inner diameter intermediate the bore.

10. The combination of claim 1 wherein said bushes are formed of natural or synthetic rubber or plastics material.

11. The combination of claim 1 wherein said rod or bar is made of two parts one said part having a threaded bore, the other said part having a threaded spigot which together comprise the retaining means.



12. The combination of Claim 11 wherein each said part has a shoulder and said bushes are received on said parts and between the shoulders.

13. The combination of Claim 12 including washers spaced between each said shoulder and a respective said bush.

14. A stabilizing bar or torque rod in combination with a bush assembly for a vehicle substantially as hereinbefore described with reference to Figure 1 of the accompanying drawings in combination with Figures 2 to 5 or Figures 6 to 8 or Figure 10 of the accompanying drawings.

**THIS PAGE BLANK (USPTO)**